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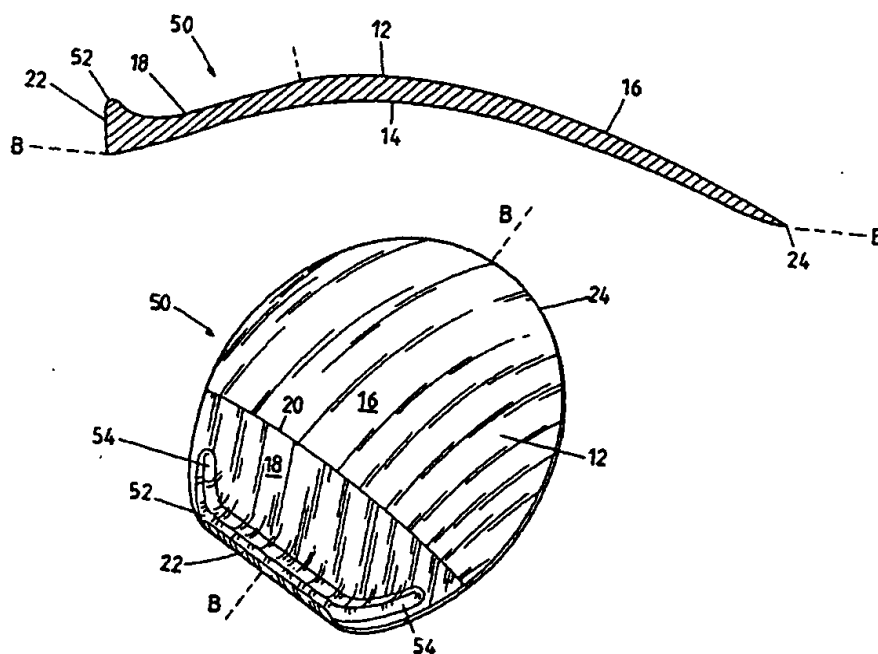
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(75) Inventor/Applicant (for US only): EZEKIEL, Donald, Frederick [AU/AU]; 43 outram Street, West Perth, W.A. 6005 (AU).
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(54) Title: SOFT MULTIFOCAL CONTACT LENS



(57) Abstract: A multifocal contact lens (10, 50) made of flexible material is able to translocate on an eye by virtue of a lower end (22) of the contact lens (10, 50) being truncated so as to provide a relatively wide surface. The lower end (22) engages with the lower eyelid of a wearer. The lower end (22) may be provided with a forwardly projecting ledge (52).

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TITLE

SOFT MULTIFOCAL CONTACT LENS

FIELD OF THE INVENTION

The present invention relates to a Contact Lens.

5

SUMMARY OF THE INVENTION

In accordance with one aspect of the present invention there is provided a multifocal contact lens made of flexible material, the contact lens being arranged to translocate on an eye.

10

DESCRIPTION OF THE DRAWINGS

The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

15 Figure 1 is a front perspective view of a contact lens in accordance with a first embodiment of the present invention;

Figure 2 is a cross-section along the line A-A of Figure 1;

20 Figure 3 is a front perspective view of a contact lens in accordance with a second embodiment of the present invention; and

Figure 4 is a cross section along the line B-B of Figure 3.

DETAILED DESCRIPTION OF THE INVENTION

In Figures 1 and 2 of the drawings there is shown a contact lens 10 having a front surface 12 and a rear surface 14.

5

As shown in the drawings, the front surface 12 is subdivided into a distant vision front segment 16 and a close range vision front segment 18.

The distant vision front segment 16 has a curvature which preferably conforms to a
10 spherical, aspherical or toroidal shape. It has been found that use of an aspherical shape for the front segment 16 enables the lens 10 to be made relatively thin.

Similarly, the close range vision front segment 18 has a curvature which preferably conforms to a spherical, aspherical or toroidal shape. It has been found that the use of
15 an aspheric shape allows for a progressively variable close range reading area.

The segments 16 and 18 may meet along a line 20 as shown in Figure 1 depending on the respective curvatures of the segments 16 and 18. Alternatively, the segments 16 and 18 may meet at a point.

20

The segment 18, as can be seen in Figure 2, may be relatively thick compared to the segment 16 and may be in the form of a prism.

The prism stabilises the contact lens 10 on the eye and the amount of the prism depends on the lens power but it is preferably sufficient to hold the lens in position on the eye without rotation and without being uncomfortable for the patient.

- 5 The contact lens 10 is formed of a flexible material which is also soft. For example the contact lens 10 may be formed of soft hydrogel, silicone or a hybrid material formed from soft hydrogel and silicone or other flexible material. Further, the lens 10 is relatively large being, for example, larger than a corneal lens.
- 10 The contact lens 10 has a lower end 22 and an upper end 24. The prism is located adjacent the lower end 22. The presence of the prism adjacent the lower end 22 results in the contact lens 10 having a relatively bulky and heavy portion adjacent to the end 22. The end 22 is, as can best be seen in Figure 2, truncated so as to leave an end surface which is relatively wide compared to a nontruncated end. The truncation
- 15 of the end 22 allows the contact lens 10 to rest on a lower eye lid of a patient so as to engage and hold the contact lens 10 in position.

Further, the rear surface 14 of the lens 10 is formed in a curved shape which may be spherical or aspherical or may be toroidal to correct for a patient's astigmatism.

- 20 Further, adjacent the end 22 and the end 24 the rear surface 14 is preferably formed with secondary curve portions 26 or 28 respectively. The secondary curve portions 26 and 28 have a curvature which is less pronounced than that of the rear surface 14 so as to modify the lens fitting on the eye so as to facilitate translocation. The secondary

curves may each be a single curve, a series of curves, an aspherical curve, or a combination of these curves.

The secondary curve portions 26 and 28 may only extend along part of the periphery of the lens 10 adjacent the ends 22 or 24 or they could be lengthened to extend around most of or all of the periphery of the lens 10.

The position of the junction 20 between the segments 16 and 18 may be varied as with bifocal spectacle lens, so that the position of the close range vision portion 18 may be customised to each patient. This allows the lens 10 to be fitted precisely to the eyes of an individual patient.

As discussed above, the lower portion of the lens 10 adjacent the end 22 is bulkier and heavier than the upper portion adjacent the end 24. This ensures that the lens 10 is orientated in the correct way in use so that the distant vision segment 16 is uppermost and the close range vision segment 18 is lowermost.

Further, the contact lens 10 may have lateral lenticular portions 30 adjacent sides thereof. The lenticular portions 30, where present, are cut away portions which reduce lens bulk.

The contact lens 10 preferably has an overall size of from 10 to 16 mm preferably from 12.5 to 14.5 mm. The truncation at the lower end 22 may reduce the overall size of the lens by from 0.05 to 5mm preferably by from 0.5 to 3mm.

The contact lens 10 could have a third intermediate power vision segment between the segments 16 and 18. Further, the close range vision segment 18 may include an intermediate segment which is preferably a progressively variable or graduated portion for close vision.

In use, the lens 10 of Figures 1 and 2 is fitted to a patient's eye with the end 22 abutting the lower eyelid of the eye. Thus, when the patient looks downward, the eye moves relative to the contact lens 10 so that the visual axis is through the close, intermediate or graduated range vision segment 18.

The contact lens 10 cannot move downward because of the engagement between the end 22 and the lower eyelid. Alternatively, when the patient looks up, the eye moves again relative to the contact lens 10 which is retained in place by the weight of the segment 18, so that the visual axis is through the upper portion of the contact lens 10 corresponding to the top portion or distant vision segment 16.

Thus, in operation, the contact lens 10 translocates relative to the eye so that the patient can selectively look through the lower close range vision segment 18 or the distant vision segment 16. Translocation is aided by the presence of the secondary curve portions 26 and 28.

In Figures 3 and 4, there is shown a contact lens 50 which is similar to the contact lens 10 and like reference numerals denote like parts.

In this case, however, the lower end 22 is provided with a forwardly projecting ledge 52 which, in use, is arranged to rest on the lower eyelid. The use of the ledge 52 has the advantage that the segment 18 may be made thinner than in the contact lens 10.

5 Alternatively, the ledge 52 may be used in conjunction with a prism to add bulk to the lower part of the contact lens 50 to assist in correct lens orientation.

Further, the use of a thinner segment 18 reduces the overall weight of the contact lens 50. Thus, the contact lens 50 may or may not have the lenticular portions 30 of the
10 contact lens 10.

The ledge 52 may extend across the entire lower end 22 of the lens 50 or over only a portion of the lower end 22. Typically, the ledge 52 may be from 2 to 10mm, preferably from 4 to 6mm wide at the end 22 where the contact lens 50 is truncated.
15

The presence of the ledge 52 adds bulk to the lower end 22 so allowing good lid action on the contact lens 50 to allow for lens translocation.

Further, as can be seen in Figure 3, the ledge 52 may be provided with upwardly
20 curved end portions 54 which act as weights and help to stabilise the contact lens 50 in use. The ledge 52 and the portions 54 may be conveniently formed by means of a lathe or incorporated in a mould depending on the method of manufacture.

Modification and variations as would be apparent to a skilled addressee are deemed to be within the scope of the present invention.

CLAIMS

1. A multifocal contact lens characterised in that the contact lens is made of flexible material and the contact lens is arranged to translocate on an eye.
5
2. A contact lens according to claim 1, characterised in that the contact lens has a front surface and a rear surface, an upper end and a lower end.
3. A contact lens according to claim 2, characterised in that the front surface of
10 the contact lens is formed into a distant vision segment and a close range vision segment.
4. A contact lens according to claims 3, characterised in that there is an intermediate vision segment between the close range vision segment and the distant
15 vision segment.
5. A contact lens according to claim 4, characterised in that the intermediate vision segment is progressively variable.
- 20 6. A contact lens according to any one of claims 3 to 5, characterised in that the distant vision segment is spherical, aspherical or toroidal in shape.
7. A contact lens according to any one of claims 3 to 6, characterised in that the close range vision segment is spherical, aspherical or toroidal in shape.

8. A contact lens according to any one of claims 2 to 7, characterised in that the lower end of the contact lens is truncated so as to provide a relatively wide end surface.

5

9. A contact lens according to any one of claims 2 to 8, characterised in that the close range vision segment is relatively thick compared to the distant vision segment.

10. A contact lens according to claim 9, characterised in that the close range vision segment incorporates a prism to assist lens orientation.

11. A contact lens according to any one of claims 2 to 10, characterised in that the contact lens is larger than a corneal lens.

15 12. A contact lens according to claim 11, characterised in that the contact lens has an overall size of from 10 to 16mm.

13. A contact lens according to claim 12, characterised in that the contact lens has an overall size of from 12.5 to 14.5mm.

20

14. A contact lens according to claim 12 or 13, characterised in that the truncation reduces the overall size of the lens by from 0.05 to 5mm.

15. A contact lens according to claim 14, characterised in that the truncation reduces the overall size of the lens by from 0.5 to 3mm.
16. A contact lens according to any one of claims 2 to 15, characterised in that the rear surface has a curved shape.
17. A contact lens according to claim 16, characterised in that the rear surface has a spherical, aspherical or toroidal shape.
18. A contact lens according to claims 16 or 17, characterised in that the lens has one or more secondary curve portions adjacent edges of the rear surface, the or each secondary curve portion having a curvature which is less pronounced than that of the rear surface.
19. A contact lens according to any one of claims 2 to 18, characterised in that at least part of the periphery of the contact lens is formed with a lenticular portion adjacent sides of the contact lens.
20. A contact lens according to any one of claims 2 to 19, characterised in that the lower end is formed with a forwardly projecting ledge.
21. A contact lens according to claim 20, characterised in that the ledge is from 2 to 10mm wide.

22. A contact lens according to claim 21, characterised in that the ledge is from 4 to 6mm wide.

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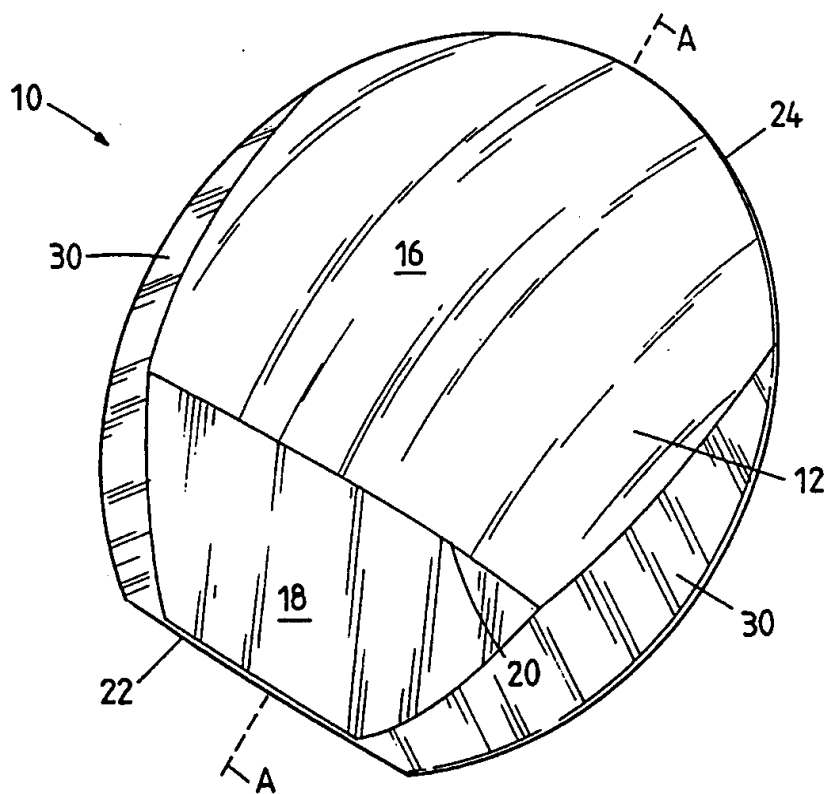


FIG.1

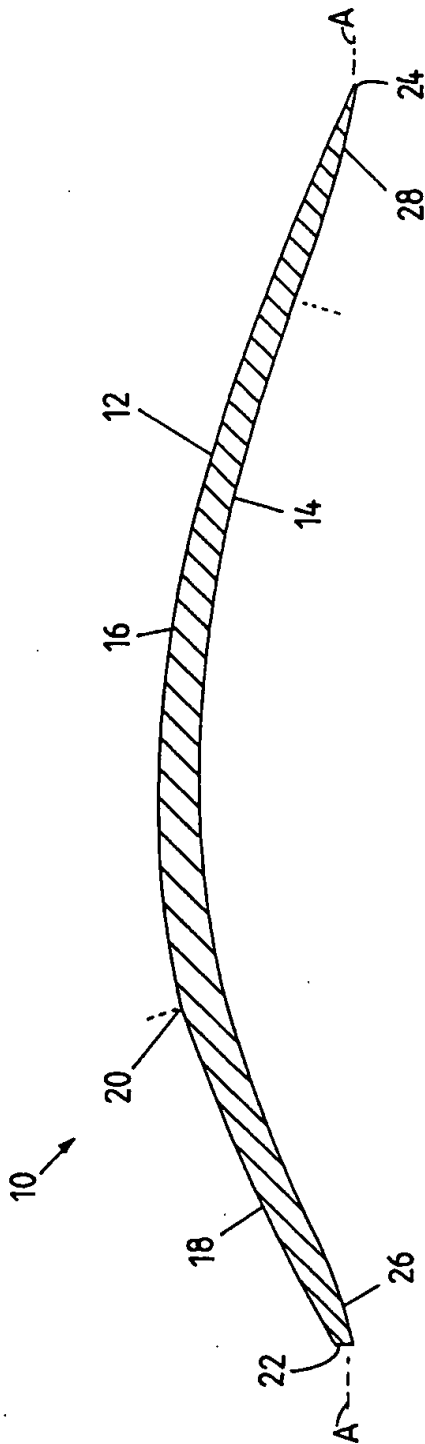
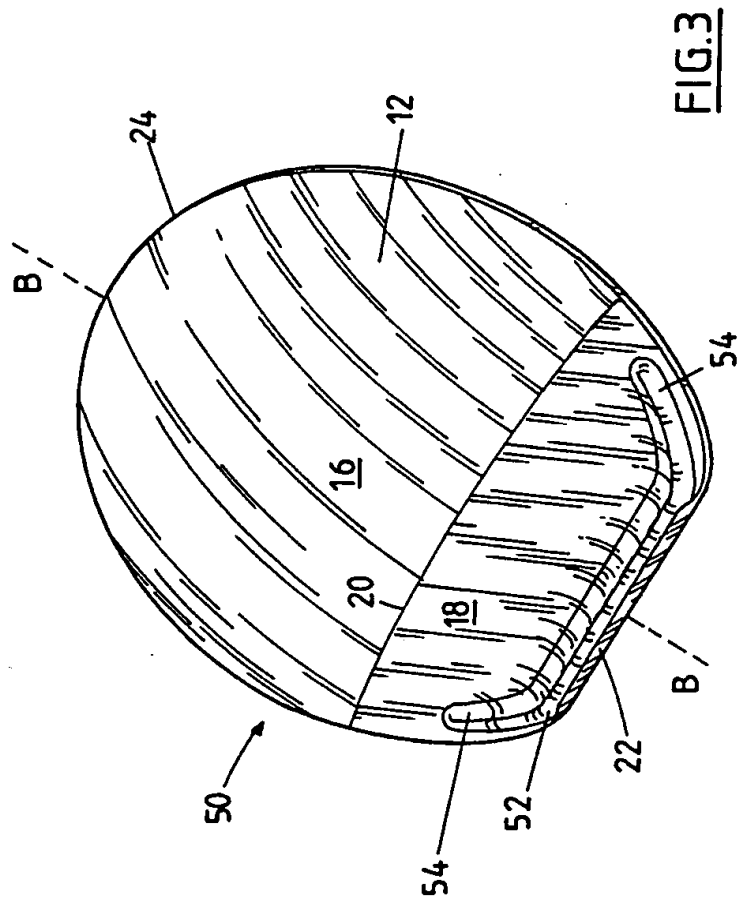
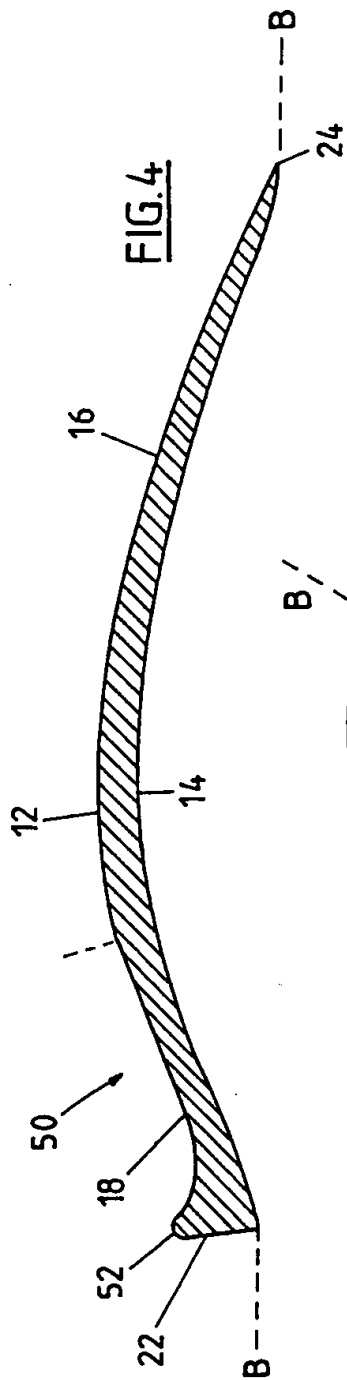


FIG. 2

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU00/01531

A. CLASSIFICATION OF SUBJECT MATTER												
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According to International Patent Classification (IPC) or to both national classification and IPC												
B. FIELDS SEARCHED												
Minimum documentation searched (classification system followed by classification symbols) IPC: G02C 7/-												
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched												
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DWPI, JAPIO Keywords: contact lens; bifocal, multifocal, progressive; lower, bottom, base; ledge, edge, support, eyelid, truncat, flat												
C. DOCUMENTS CONSIDERED TO BE RELEVANT												
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.										
X	WO 99/23527 A (BERNSTEIN) 14 May 1999 Pages 4-7, Figures 1-5	1-7, 9, 11-13, 16-17, 20-22										
X	US 5635998 A (BAUGH) 3 June 1997 Columns 1-3, Figures 1-3	1-10, 14-17										
X	US 5071244 A (ROSS) 10 December 1991	1-3, 6-7, 9, 11-13, 16-17, 20-22										
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex												
<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	"P" document published prior to the international filing date but later than the priority date claimed	
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art											
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Date of the actual completion of the international search 16 January 2001		Date of mailing of the international search report 17 January 2001										
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929		Authorized officer MICHAEL HALL Telephone No : (02) 6283 2474										

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU00/01531

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2582416 A (BOURGEOIS, SOCIETE ANONYME) 28 November 1986 Pages 4-8, Figures 1-6	1-4, 6-9, 14-18
X	US 4573775 A (BAYSHORE) 4 March 1986 Columns 2-5, 8, Figures 1-10, 17-20	1-7, 9-13, 16-19
X	WO 84/04401 A (SCHERING CORPORATION) 8 November 1984 Pages 2-9, Figures 1-2	1-9, 11-17

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU00/01531

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
WO	9923527	AU	13794/99	EP	1029255	US	6109749
US	5635998	NONE					
US	5071244	NONE					
FR	2582416	NONE					
US	4573775	AU	18129/83	BR	8304473	CA	1228756
		DK	3773/83	EP	102223	GR	81367
		JP	59053812	MX	157390	NZ	205166
		ZA	8306111				
WO	8404401	EP	158638	US	4549794		
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